

## **Summary of the discussions of the Twenty fourth meeting of Scientific Advisory Committee to Cabinet (SAC-C) held on 22<sup>nd</sup> November, 2012 at VigyanBhawan Annexe, New Delhi**

The agenda of the meeting and list of participants are at Annexure I and Annexure II, respectively.

### **M24 A1 Opening Remarks**

**Dr. R. Chidambaram**, Chairman SAC-C welcomed all the members and specifically the new members to the 24<sup>th</sup> meeting. He then briefly mentioned the activities of PSA office particularly the synergy projects which had been supported and encouraged by SAC-C. Before taking up the agenda, he suggested to take up item no. 10 immediately after Prof. Raghavan's presentation. He then briefly touched upon the agenda items.

- He stated that Department of Science and Technology is formulating the National Science, Technology and Innovation policy. Dr. Ramasami will make a presentation on the contours of the policy, which is planned to be released in the Indian Science Congress 2013, being its 100<sup>th</sup> session. It is also important as the Prime Minister, Dr. Manmohan Singh Ji is the general President of the congress. SAC-C shall have a brief discussion on this topic, as innovation is important for National Competitiveness.
- Dr. Chidambaram added that NIAS had submitted a very interesting proposal on saving energy by advancing the Indian Standard Time by half an hour. This item will be considered for making an appropriate recommendation.
- He informed about the committee on Photonics chaired by Prof. Ajay Sood, IISc Bangalore which prepared a road map for the development of this area. The status of this activity will be considered by the committee. He recalled that a similar effort catalysed by this office on Nanoelectronics, which was carried out by IISc and IITB. It was supported by DIT with a budget of Rs. 100 crore.
- He mentioned that Dr. Bahuguna will make a presentation on a very interesting topic - Fringe forests and their usefulness in retaining water in

soil, etc. SAC-C shall discuss the subject and make an appropriate recommendation to the concerned Ministry.

- Research Universities are becoming important in advancing knowledge and on ranking of universities. There will be a presentation on Global Research Universities by Dr.Sathyamurthy, IISER, Mohalifor the consideration of the Committee.
- ICAR will make a presentation on Buffalo genomics.

Touching upon the NKN project, which is being implemented by NIC and also spearheaded by this office, he said that it has received great appreciation from all quarters. NKN has already connected about 900 knowledge institutions. NKN also showcased its efforts in the 1<sup>st</sup> National Workshop last month at IIT Bombay, Mumbai, which received unexpectedly high participation.

He then invited Prof. SV Raghavan, Scientific Secretary, to give an overview of the activities of PSA office.

#### **M24 A2 Activities of Office of PSA – Prof. S. V. Raghavan, Scientific Secretary, Office of PSA**

Prof. Raghavan gave a brief account of the on-going activities of PSA office. He shared the various initiatives under taken by the office including CAREL, Machine Tools, Science behind Ayurveda, RuTAG, PPP etc. He said that in some cases the Office directly supports the programme and in other cases it catalyses and partners with other departments.

Taking RuTAG as an example, he elaborated the mechanism adopted for selecting and funding the synergy projects. He said that efforts in RuTaghad led to many technology solutions for rural mass implemented through IITs & NGOs.

He informed that the rich experience gained in Nano electronics by supporting IITB and IISChas now led to the proposal for a Prototype fab initiative in 12<sup>th</sup> plan for making high value and low volume chips.

He mentioned that NKN will be eventually connecting 1500 institutions and it is being implemented in association with DIT and NIC.

Synergy projects are also implemented in advanced technology areas with active support of multiple organisations e.g. Advanced Ultra Super Critical (AUSC) programme involving IGCAR, BHEL & NTPC.

Besides, PSA's office has also initiated projects on explosive detection using various techniques such as ion-mobility spectrometry, micro-cantilever based sensor & immuno chemical techniques with multiple institutes.

The office is actively associated with National Security council secretariat in matters relating to cyber security – R&D, Indigenization, and Human Resource Generation.

The new initiatives under development are green chemistry and medical devices, where technological gaps have been identified for funding.

The fundamental philosophy for the working of the Office of PSA is:

- Coherent Synergy
- Directed Basic Research (Collaborative, wherever feasible)
- Pre-competitive Industrial R&D
- Maximize Industry-Academia interaction
- Use existing systems as delivery vehicles.

All activities are carried out with the support of SAC-C. The details of his presentation are at Appendix 'A'.

#### **M24 A10: Open discussion**

This was followed by a detailed discussion and members shared the following views:

- Dr. Sikkam mentioned that office of PSA had brought out a report on S&T Roadmap for 11<sup>th</sup> Plan for Planning Commission. Reports were also prepared on clean coal technologies and climate change. The recommendations of SAC-C on integrated course of graduation & post-graduation led to creation of IISERs in the country. Recommendations for undergraduate courses at IISc and Tata Institute were also proposed.
- Dr. S. K. Joshi complemented the Office of PSA for initiating many activities for the first time. He pointed out that links between industry & academia are still poor and are not organised in such a way to derive the fruits for benefit of the country, which is crucial to bring in the economic growth to the country and society. New initiatives are necessary to couple industry and academia in R&D efforts at an early

stage for greater impact. This aspect needs to be visited repeatedly and re-emphasized. He mentioned that greater impact of R&D is being achieved with such efforts in China.

- Chairman mentioned that earlier Indian industry used to only look for proven technologies; but now with Indian industries vying with global companies, the scenario is changing. Indian Industry is partnering with academia for newer innovative products. Agreeing with Dr. Joshi, he said this needs to be encouraged and accelerated. Towards this, Office of PSA had initiated projects under automotive sector, machine tools sector and the electronics hardware (CAREL). Also the efforts of TIFAC MSME programme in bringing together technologically homogenous cluster with proximate academic institute have helped bridging the gap between industry and academia. He narrated the experience of *Howrah MSME foundry cluster* to substantiate the point.
- Secretary MSME informed about the efforts of MSME in bringing together the industry and academia. He said that Ministry had entered into MoUs with IISc & CSIR for providing technology and research support to micro, small and medium scale industries. He further said that the network with scientific institutions is being expanded.
- Prof. Raghunathan stated that a symposium is being contemplated to encourage the interaction between industry and mathematics researchers. He felt that it would benefit the industry immensely.
- Prof. Dinesh Singh, VC Delhi University emphasized the need to reorient the undergraduate study from black board oriented to entrepreneurship. He gave the example of the Innovation Centre at Delhi University where undergraduate students mapped the entire water system of a rural village and have come up with modelling, graph theory & fluid dynamics to provide solutions.
- Dr. Krishna Ella said that our education system is market driven, and not interest driven. To create interest in science, he said that NSF picks up 100000 candidates of class 9<sup>th</sup> -12<sup>th</sup> for summer internship. Some of these candidates produced outstanding results. He suggested

that the education in science has to be interest driven specially at earlier stages. Intervening in the discussion, Chairman informed the members that INSPIRE does something like that. However, assured career to young researchers is necessary to attract best talent. He then requested Dr.Ramasami to elaborate on INSPIRE.

- Dr. T. Ramasami, informed the status of INSPIRE programme and how it is capturing the interest of best students to science. The target is to capture 9.6 lakh students in the age group of 10 – 25 in the next three and half years. The programme spans from district to national level. About 85 innovations developed by the students have been applied for provisional patents. Contrary to expectations, he said that US is following the INSPIRE scheme. He mentioned that the scaling and scoping is crucial for the assessing the national impact of this scheme.

### **M24A3 Draft National Policy on Science, Technology & Innovation**

Initiating the agenda, Dr.Ramasami informed the members that formulation of the new National Policy on Science, Technology and Innovation was assigned to DST. The department had large consultations in arriving at the draft. Efforts are being made to release the new policy during the National Science Congress 2013. The department is attempting to bring in a shift from ‘Policy for Science’ to ‘Science Policy for people’.

With the permission from Chair, Sh. Neeraj Sharma made a brief presentation on the process adopted for formulation and features of the science, technology & innovation policy to be enunciated in 2013. He highlighted that STI policy will provide vertical integration of all three dimensions, namely, science, technology and innovation into aiding socio-economic development processes. He shared that this policy is required for connecting STI system for inclusive growth and combining priorities of excellence with relevance. The details of his presentation are at ‘Appendix B’.

During deliberations the following views have emerged:

- Chairman said that Science leads to generation of new knowledge, but innovation helps in deriving economic value or strategic value or societal benefit from knowledge. Though innovation is a buzz word today, if India is to emerge as a developed country, fundamental research, applied

science and manufacturing skills are all needed together to progress at rapid pace.

- Prof. Sood suggested whether an Indian National Academy of Innovation can be created as a reward system to encourage innovation in the country. Intervening in the discussion, Dr. Ramasami said that Innovation recognition is difficult. Therefore, performance reward in innovation must empower institutes to develop more innovations.
- Prof. S.K. Joshi said that our system is overpowered by knowledge creation. But it does not take into consideration of how to take it towards innovation. He further said that only knowledge creation is not sufficient but its gainful applicability to the society is more needed.
- Prof. Baldev Raj said that it is necessary to have policy interventions to improve Public-Private-Partnership programmes as tools for developing innovations. The quality of the human resources (technicians/lab assistants) and entrepreneurship in high science & technology areas has to be encouraged.
- Dr. Krishna Ella said that University innovation is having no impact and there is greater need for university-industry partnership interfaces.
- Dr. Devang Khakhar said that Industry has to play a big role in developing innovations. The role of Universities is very crucial to increase the innovations.

*The committee decided that members may communicate their views directly to Secretary, DST in writing. It is available for view on DST website. To facilitate the process further, the Office of PSA will forward a copy of the STI policy to all the members.*

#### **M24A4 –A proposal for Advancing Indian Standard Time- Presentation by NIAS**

Initiating the proposal, Dr. Ramamurty said that it is a simple issue needing an even simpler solution. Currently Indian time is five and half hours ahead of GMT. The suggestion is to make it six hours ahead of GMT.

Thereafter, with the permission of Chairman, Prof. D. Sen Gupta and Prof. Dilip R. Ahuja from NIAS presented the detailed proposal for Advancing Indian Standard Time. They informed the Committee that they recommend one-time advancement in IST by half hour. They informed the committee that,

although the average energy savings are marginal, it matters at evening peak load significantly.

The details of the presentation are at Appendix 'C'.

The item was further discussed.

- Dr.Selvamurthy informed the committee that TERI had carried out a similar study earlier and reported negligible savings. He further said that social dynamics and social cost in advancing the time need to be looked into. Some members of the committee felt that since the savings are achieved at no additional cost, the numbers have no meaning. Further, in view of its advantages at evening peak load, social cost has no relevance.
- Dr.Ramasami informed the committee that the subject matter was referred to DST by PMO for further examination and suitable recommendation. Advancing time will have some impact on the Railways as they have to incur expenditure. Earlier a similar study that recommended two time zones was rejected by the then Secretary, DST and NPL. However, the option of shifting it one time was not considered at that time. He felt that this model of onetime adjustment is the best option. DST is examining the issue and it had written to NE states and J&K seeking their views and the department is awaiting their response. The recommendation of SAC-C will be taken into consideration in arriving at the final recommendation.

*The committee recommended that among the options presented the model of one time advancement of IST by half hour is more practical and reasonable. This will help in easing evening time peak load problem and also be helpful for the North-Eastern states. But the committee felt that there is a need for more deliberations on this matter. It thus recommended DST to take an appropriate decision keeping in view the SAC-C observation in arriving at the final recommendation.*

**M24A5      A Status report on Photonics initiatives- Prof. A K Sood, IISc Bangalore**

Prof. A.K. Sood presented the activities of the Apex Committee for an Integrated Photonics Initiative constituted by the Office of the Principal Scientific Adviser to the Government of India covering details of the technology Road Map for research and development in various streams of Photonics. He identified

technology gap areas vis-à-vis the scientific capabilities already existent in the country and that which needs to be nucleated/created. He informed the Committee about the requirements of laser diodes & arrays, fibre lasers in the country and its implementation strategy. He further informed that the area of plasmonics is still at evolving stage and needs more research inputs. He shared the recommendations of the Apex committee for (i) setting –up of a National Centre on Diode Lasers at Solid State Physics Laboratory (SSPL), N. Delhi (ii) creation of a centre for studies on plasmonics at National Physical Laboratory(NPL), New Delhi (iii) creation of a National Programme on Fibre Lasers with Raja Ramanna Centre for Advanced Technology(RRCAT), Indore & Central Glass and Ceramic Research Institute(CGCRI), Kolkata. The details of his presentation are at Appendix ‘D’.

During subsequent discussion, the following points emerged:

- Dr. S.K. Joshifelt that in the area of Diode Lasers and Fibre Lasers a lot of“catching-up” to do with the rest of the world and it would be difficult to compete in these areas in open market place. He thus emphasized on placing more efforts in the area of plasmonics, which is emerging to create a nichefor the country.Responding to the observations, Dr. Sood said that developing higher wattage diodes are difficult andPico second laser development is still relevant. He further said that some opportunitiesdo exist in these two areas.
- Dr.Selvamurthysaid that photonics is a fascinating and extremely important area. DRDO had initiatedthe work and developed laser diode(100 W) and would like to upscale to 1 KW.DRDO has interest in photonics for directed heavy energy weapons, blue green lasers for under water communication and photonics sensors for chemical detection. DRDO is also interested in Quantum Cascade Lasers. Dr. A.K. Soodinformed the committee that an enormous R&D effort will be required in the country to develop Quantum Cascade Lasers.
- Dr. Milan K. Sanyal suggested that an SERC School could be started in photonics and requested for consideration of Secretary, DST.
- Dr.Ramasami informed the members that DAE-DST and DRDO-DST have signed umbrella MoUs. As per the MoUs, the non-strategic area

developments shall be funded by DST and strategic areas as well as product development will be funded by the DRDO and DAE. He felt that the first few projects must focus on delivery to gain confidence.

*The committee appreciated the efforts of the group on integrated photonics initiative and congratulated Dr.Sood for his leadership. After further deliberations SAC-C recommended the following decisions:*

- i. The DST will fund projects in non-strategic areas of photonics. DAE, DoS, and DRDO, will support the projects in strategic areas as well as product development;*
- ii. The facilities of proposed Centre on Diode Lasers at SSPL, New Delhi and the National Programme on Fiber Lasers at RRCAT, Indore and CGCRI, Kolkata must be available to scientists/academicians from other universities and research institutes of the country;*
- iii. Creation of a center for studies on Plasmonics at NPL could be funded by the CSIR from its internal resources.*
- iv. PSA office will enable the activities in Photonics by coordinating various departments.*

#### **M24A6 Indian Science Congress – Presentation by Dr. T. Ramasami, Secretary,DST**

Dr.Ramasami reported to SAC-C about the centenary year celebrations 2012-13 for Indian Science Congress with theme “Science for shaping the future of India”. He said that this year it is going to be very special as Prime Minister is the General President of the Science Congress. He then discussed the major deliverables and technical programme to be conducted during the event. The details of the presentation are at Appendix “E”.

*It was discussed further and decided that members could communicate their views directly to Dr.Ramasami, Secretary, DST.*

#### **M24 A7 Fringe Forests vis-à-vis Food and Water Security in India by Dr.V.K. Bahuguna, DG, ICFRE, Dehradun**

Dr.Bahuguna in his presentation brought out the importance of fringe forest for food and water security. He stated that degraded and neglected ecosystems have resulted in low food grain production in downstream areas, resulting in more poverty, loss of biodiversity, depletion of water resources and degradation of fringe forests. The solution for achieving this is the holistic approach of

integrated land-water based activities of agriculture, forests, animal husbandry, fishery, horticulture, rural development & micro & medium enterprises. He also discussed the success stories in Hivre Bazar, Fakot, Bundelkhand etc. The details of the presentation are at Appendix “F”.

During subsequent discussions, the following points emerged:

- Dr. R. B. Singh commented that degradation of fringe forest is a real problem and not appreciated well. There is genuine concern on this issue in the scientific community. This is no one's land and approximately 35 million hectare land is degrading fast. The Forest Right Act and Tribal Acts are well defined but no action is being taken in the right direction. The Ministry of Agriculture and Ministry of Environment and Forests have to come together and take a comprehensive view in this matter. He suggested PSA office could catalyse this. He mentioned that Planning Commission has also appreciated this issue.
- Dr. Ramasami felt that sufficient investment is not there in agricultural research. It is an important issue and cannot be ignored for long. He felt involvement of other science institutions in agricultural research is necessary to bring in a sea change. He requested chairman to hold a separate discussion on this subject. Chairman agreed to the suggestion.

*The Committee resolved that Chairman may write a letter to the concerned Ministries bringing to their notice the importance of Fringe Forest development. It was further resolved that the letter may be drafted in consultation with Dr. R.B. Singh. The matter may also be brought to the notice of Prime Minister Office.*

#### **M24 A8 Global Research Universities: Relevance to India – Prof. N. Sathyamurthy, Director IISER, Mohali**

Prof. N. Sathyamurthy gave an overview of the global research universities, the criteria, procedure adopted for ranking system etc. He discussed the example of Korea & Singapore universities. He emphasized that a good university should have good students, good faculty & good practices. Global Research University should have international students & faculty, joint degree programmes, centre of excellence etc. He felt that Indian Institutions are still not ready to become Global Research Universities. The Institutions need better governance,

functional autonomy, and improved infrastructure. He stated that IISERs size is too small to become global research universities and require more international faculty & students. He urged that India should develop its own ranking system rather than trying to adopt the existing global ranking system. The details of the presentation are at Appendix “G”.

During subsequent discussions, the following points emerged:

- Dr. Pratibha Jolly shared her experience with the workshops on collateral issues in “Education for Innovation” organised with OECD, Planning Commission and CII. She said that it’s important to relook at the university frame work, networking with international students, faculty etc.
- Can the corporate social responsibility funds be tapped for this endeavour?
- Dr. Krishna Ella suggested creation of 500 Post-Doctoral Fellowships exclusively for international students and placing them in second rung universities and institutions, like NITs.

*The Committee felt that it is an important issue and nation has to take appropriate steps in right earnest. It recommended that a Brainstorming may be organised by the Office of PSA in association with DST on this issue to get broader perspective and wider suggestions.*

#### **M24 A9- “Buffalo genomics: A way forward”**

Since the DG, ICAR could not participate in the meeting owing to prior commitments, Chairman suggested taking up the item in the next meeting.

The meeting ended with a vote of thanks to the Chair.

Meeting of the 24<sup>th</sup> Scientific Advisory Committee to Cabinet  
22<sup>nd</sup> November, 2012

Agenda

Time: 10:30 hrs

Venue: VigyanBhavan Annexe  
Maulana Azad Road  
New Delhi 110011

1. Welcome and Opening Remarks by Chairman
2. Activities of O/o the PSA – A brief outline presentation by Dr. SV Raghavan, Scientific Secretary, O/o the PSA, followed by discussion
3. A brief outline on draft National Policy on Science, Technology & Innovation – A presentation by Dr. T Ramasami, Secretary, DST followed by discussion
4. A proposal for advancing Indian Standard Time for Saving Energy : a Policy measure - A presentation by NIAS followed by discussion and recommendation
5. A status report on Photonics initiative – A presentation by Prof. AK Sood, IISc., Bangalore
6. Discussion and inputs for Indian National Science Congress – 2013: Science for shaping the future of India
7. Fringe Forests vis a vis Food and Water security in India – Presentation by Dr. V.K. Bahuguna, DG, ICFRE followed by discussion and recommendation
8. Global Research Universities: Relevance to India – Presentation by Prof. N Sathyamurthy, Director, IISER-Mohali
9. Buffalo genomics : A way forward – A presentation by Dr. R.K. Vijn, NBAGR, Karnal
10. Open discussion on the specific subjects for future consideration of SAC-C
11. Vote of Thanks by Member-secretary

**LIST OF PARTICIPANTS**

1. Dr. R. Chidambaram
2. Dr. R.A. Badwe
3. Prof. DevangKhakhar
4. Dr. Dinesh Singh
5. Dr. B. K. Gairola
6. Prof. S.K. Joshi
7. Dr.JuzerVasi
8. Dr. Krishna M. Ella
9. Prof. Milan K. Sanyal
10. Dr.Pratibha Jolly
11. Dr.ProdiptoGhosh
12. Dr. M.S. Raghunathan
13. Dr. V.S. Ramamurthy
14. Dr. N. Sathyamurthy
15. Dr. W. Selvamurthy
16. Dr. S.K. Sikka
17. Dr. V. Sumantran
18. Dr Tessy Thomas
19. Prof. VijayalakshmiRavindranath
20. Dr. J.S. Yadav
21. Prof. Ajay K. Sood
22. Dr.Baldev Raj
23. Sh. Vivek Rae
24. Dr. T. Ramasami
25. Dr. ShaileshNayak
26. Prof. R.B. Singh
27. ShriAmbuj Sharma
28. Prof. S.V. Raghavan

**Invitees**

29. Dr. V. K Bahuguna
30. Dr.B.K.Joshi
- 31.Dr.R.K.Vijh
- 32.Dr.M.S.Tantia
33. ShriNeeraj Sharma
34. Dr. D. YogeswaraRao
35. ShriNeerajSinha
36. Dr.KetakiBapat
37. Dr.ManjuGerard